

Report on TIIIIE Projects

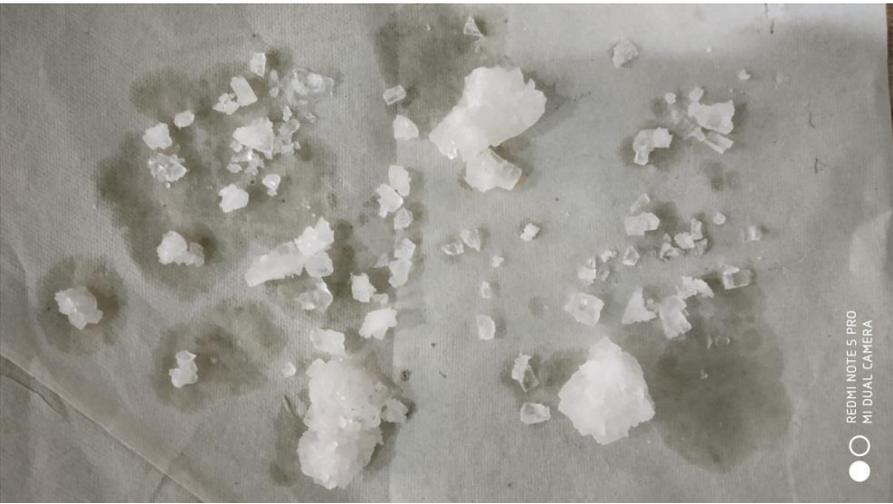
We have started working on the following projects under TIIIIE:

1. Growth of single crystals of technologically important crystals by solution growth. The following specific efforts have been made:
 - a. setting up of facilities for solution growth of crystals at room temperature and preparation of crystals of potassium dichromate and potassium chloride to be followed with growth of crystals of non-linear optical (NLO) materials; and
 - b. setting up of facilities for growth of device quality crystals from the melt by the Czochralski method and growth of nearly perfect crystals with melting points of about 800 °C.
2. Development of a professional system for growth of single crystals by the Czochralski method.
3. Develop expertise for fabrication of thermocouples at KRMU.

Progress made in growth of single crystals of potassium dichromate

Date	Experiment/Activity done	Result/Outcome
Day 1 :	Preparation of saturated solution of potassium dichromate	<p>Saturated solution of potassium dichromate was prepared by dissolving 4g powder was in 10 ml of distilled water.</p> 
Day 5	Observation of growth of crystals	<p>The quality of the grown crystals was not very good but we were able to collect some seed crystals from the crop obtained from the first experiment..</p>
Day 10	Preparation of saturated solution of potassium dichromate ($K_2Cr_2O_4$) in distilled water	<p>Saturated solution of potassium dichromate was prepared by dissolving 16.8 g in 100 ml of distilled water. The solution was filtered.</p>
Day 15	Observation of grown crystals	<p>Morphological features characteristic of $K_2Cr_2O_4$ crystals were clearly observable.</p>
Day 16	Identification and isolation of a few good quality (by visual observations) seed crystals were isolated and the rest of the solution was filtered and the seeds were added to the filtered solution for further growth	

History of growth of potassium chloride crystals for the melt

Date	Experiment/Activity done	Result/Outcome
Day 1 :	Melting of potassium chloride powder	--- g of potassium chloride was filled in a silica crucible and it was kept in a muffle furnace. It was heated to a temperature of 800 °C (the melting point of KCl) ?? (please check)
Day 2	Slow cooling of the KCl melt	Molten KCl was cooled slowly.
Day 3	Observation of Solidified KCl crystal grown	
Day 10	Obtaining seed crystals from the solidified melt of KCL	

A novel approach for growth of potassium chloride whisker crystals

Date	Experiment/Activity done	Result/Outcome
Day 1 :	Preparation of saturated solution of potassium chloride in distilled water	16.8g of potassium chloride powder was dissolved in 100 ml of distilled water to obtain a saturated solution.
Day 20	Observation of crystal grown on the sides of a porous earthen pot.	Very beautiful whisker crystals were found to be grown as thin needles on the outer surface of the pot. 

Timing Outline for making Copper-Constantan Thermocouples at KRMU

Date	Experiment/Activity done	Result/Outcome
Day 1:	Production of spark in order to make a junction of the two metals wires using carbon rod and rheostat	Spark could not be produced due to unavailability of Variac (Autotransformer)
Day 10	Welding of two metal wires to make a junction using spot electric welding by creating a device in the laboratory.	
Day 10	Demonstration of thermocouple using Bunsen Burner	A voltage of few millivolts was obtained in the thermocouple when the junction was heated using a Bunsen Burner.